WEIL-McLAIN®

LGB

Gas–fired boiler

Control Supplement

LGB-6 to LGB-20 Series 2 – Natural gas

CSD-1 Control System

Contents

I. Installation 2
II. Gas piping 4
III. Water and steam trim components 5
IV. Wiring 5
Sequence of operation 8
Wiring procedure 8
V. Leak test procedure ... 10
VI. Operating instructions 11
VII. Parts list 12

These terms are used throughout this manual to bring attention to the presence of hazards of various risk levels or to important information concerning the life of the product.

⚠WARNING Indicates presence of hazards that can cause severe personal injury, death or substantial property damage.

NOTICE Indicates special instructions on installation, operation or maintenance that are important but not related to personal injury or property damage.

⚠WARNING This Control Supplement must only be used by a qualified installer/service technician. Read these instructions completely before beginning the installation. Failure to follow these instructions can cause severe personal injury, death or substantial property damage.

Part Number 550-141-815/1010

I Installation

1. Assemble pilot burner and flame sensor to main burners with pilot brackets. See Figures 1 and 2 (page 3). Install ground wiring as shown in Figures 1 and 2 (page 3).
2. Reinstall burner assemblies. See Table 1, below for pilot burner and flame sensor locations.
3. Install gas controls and ignition control panel(s) as shown in Table 2, below and Figure 6 (page 12).

Table 1

Pilot burner and flame sensor locations

Boiler Number	Flame Sensor *		Pilot Burner *		Boiler Number	Flame Sensor *		Pilot Burner *	
	No. 1	No. 2	No. 1	No. 2		No. 1	No. 2	No. 1	No. 2
LGB-6	2	---	9	---	**LGB-14**	2	16	13	25
LGB-7	2	---	11	---	**LGB-15**	2	16	13	27
LGB-8	2	---	13	---	**LGB-16**	2	18	15	29
LGB-9	2	---	15	---	**LGB-17**	2	18	15	31
LGB-10	2	---	16	---	**LGB-18**	2	20	16	33
LGB-11	2	---	16	---	**LGB-19**	2	20	16	34
LGB-12	2	---	16	---	**LGB-20**	2	22	16	36
LGB-13	2	1`4	11	23					

* From left burner.

Table 2

Gas control arrangement

Boiler Number	7.00" W.C. Carton	Inlet Pipe Size		5.00" W.C. Carton	Inlet Pipe Size	
		Left Base	Right Base		Left Base	Right Base
LGB-6	A and B	1"	---	A and B	1-¼"	---
LGB-7	A and B	1"	---	A and B	1-¼"	---
LGB-8	C and D	1"	---	C and D	1-¼"	---
LGB-9	C and D	1"	---	C and D	1-¼"	---
LGB-10	E, F and G	1-¼"	---	E	1-½"	---
LGB-11	E, F and G	1-¼"	---	F and G	2"	---
LGB-12	E, F and G	1-¼"	---	F and G	2"	---
LGB-13	H	1"	1"	H	1-¼"	1-¼"
LGB-14	I	1"	1"	I	1-¼"	1-¼"
LGB-15	J	1"	1"	J	1-¼"	1-¼"
LGB-16	J	1"	1"	J	1-¼"	1-¼"
LGB-17	J	1"	1"	J	1-¼"	1-¼"
LGB-18	K	1-¼"	1"	K	1-½"	1-¼"
LGB-19	L	1-¼"	1-¼"	M	1-½"	1-½"
LGB-20	L	1-¼"	1-¼"	N	2"	1-½"

I Installation – continued

Figure 1

Pilot burner assembly, typical

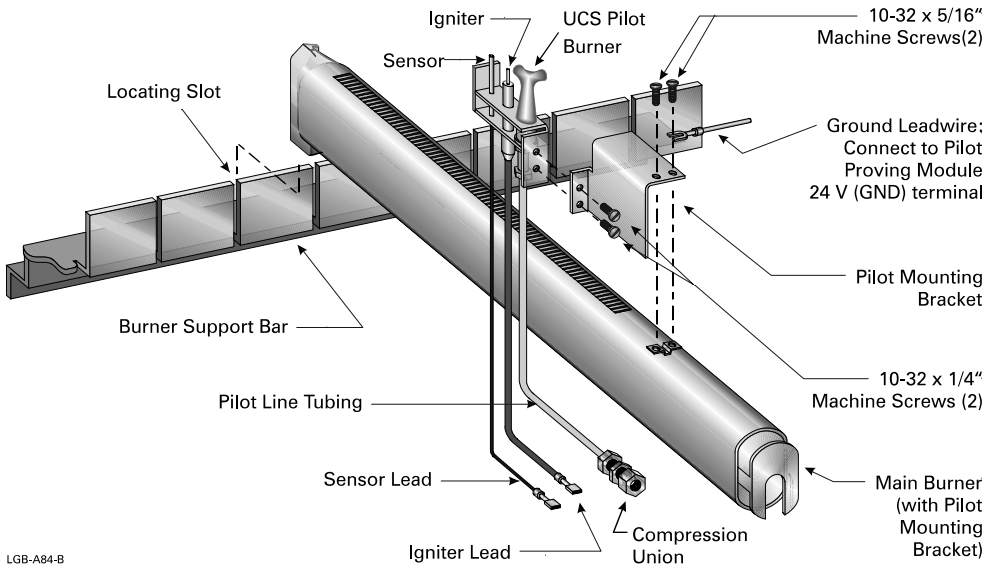
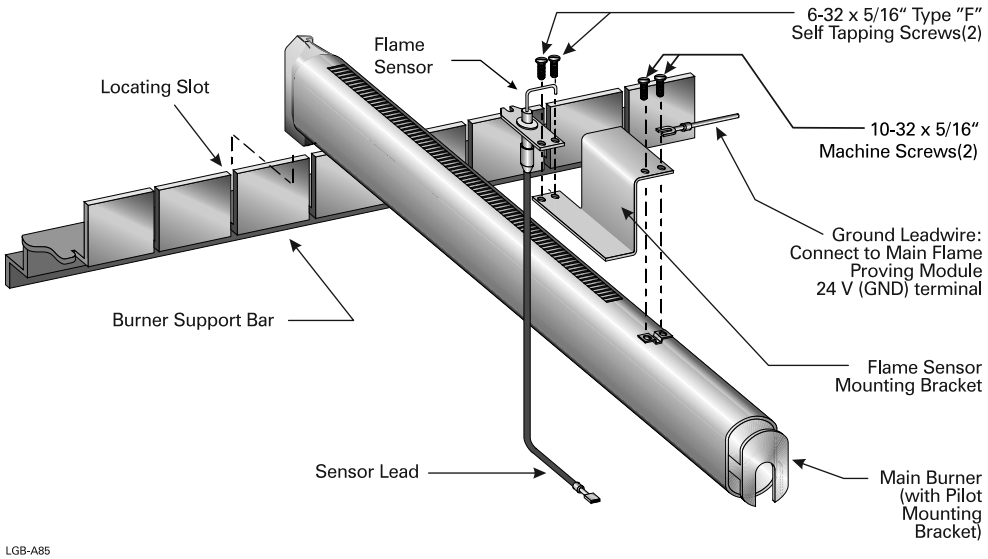


Figure 2

Main flame sensor assembly


6-32 x 5/16" Type "F" Self Tapping Screws(2)
Flame Sensor
Locating Slot
10-32 x 5/16" Machine Screws(2)
Ground Leadwire: Connect to Main Flame Proving Module 24 V (GND) terminal
Burner Support Bar
Flame Sensor Mounting Bracket
Sensor Lead
Main Burner (with Pilot Mounting Bracket)
LGB-A85

II Gas piping

1. Size natural gas piping from Table 3, below. Size piping to provide proper inlet pressure to gas valve when operating at rated input.
   a. Inlet gas pressure to manual main shut-off gas valve — minimum 7" W.C. standard (5" W.C. on special order) – maximum 13" W.C.
   b. If pressure to gas valve exceeds 13" W.C., install 100% lock-up gas pressure regulator upstream of hand valve.
   c. To obtain approximate cubic feet per hour, divide input (Btu/hr) by 1000.
2. Size gas piping considering —
   a. Diameter and length of gas supply piping.
   b. Number of fittings.
   c. Maximum gas consumption (including any possible future expansion).
   d. Allowable pressure drop from gas meter to boiler. For pressure drops, see ANSI Z223.1. – latest edition.
3. Remove knockout disc from jacket panel through which gas supply will be piped.
4. Follow good piping practices.
5. Pipe joint compound (pipe dope) must be resistant to corrosive action of liquefied petroleum gases. Apply sparingly only to male ends of pipe joints.
6. Install drip leg at inlet of gas connection to boiler. Where local code/utility requires, extend drip leg to floor.
7. Install ground joint union when required for servicing.
8. Support piping by hangers, not by boiler or its accessories.
9. Purge all air from supply piping.
10. Before operating boiler, check boiler and its gas connections for leaks.

⚠WARNING Do not check for gas leaks with an open flame – BUBBLE TEST. Failure to use bubble test or test for leaks can cause severe personal injury, death or substantial property damage.

   a. Close manual main shut-off valve during any pressure testing at less than 13" W.C.
   b. Disconnect boiler and gas valve from gas supply piping during any pressure test greater than 13" W.C.

Table 3

Gas pipe sizing - natural gas

Pipe size	***Pipe length, in feet** (Natural Gas capacities listed in MBH)							
	(Specific gravity 0.60 @ Pressure Loss of 0.30" W.C.)							
	10	**20**	**30**	**40**	**50**	**75**	**100**	**150**
1-¼"	1,050	730	590	500	440	360	305	250
1-½"	1,600	1,100	890	760	670	545	460	380
2"	3,050	2,100	1,650	1,450	1,270	1,020	870	710
2-½"	4,800	3,300	2,700	2,300	2,000	1,650	1,400	1,130
3"	8,500	5,900	4,700	4,100	3,600	2,900	2,500	2,000
4"	17,500	12,000	9,700	8,300	7,400	6,000	5,100	4,100
*Include measured length of gas supply piping and allowance in feet for number and size of fittings.								

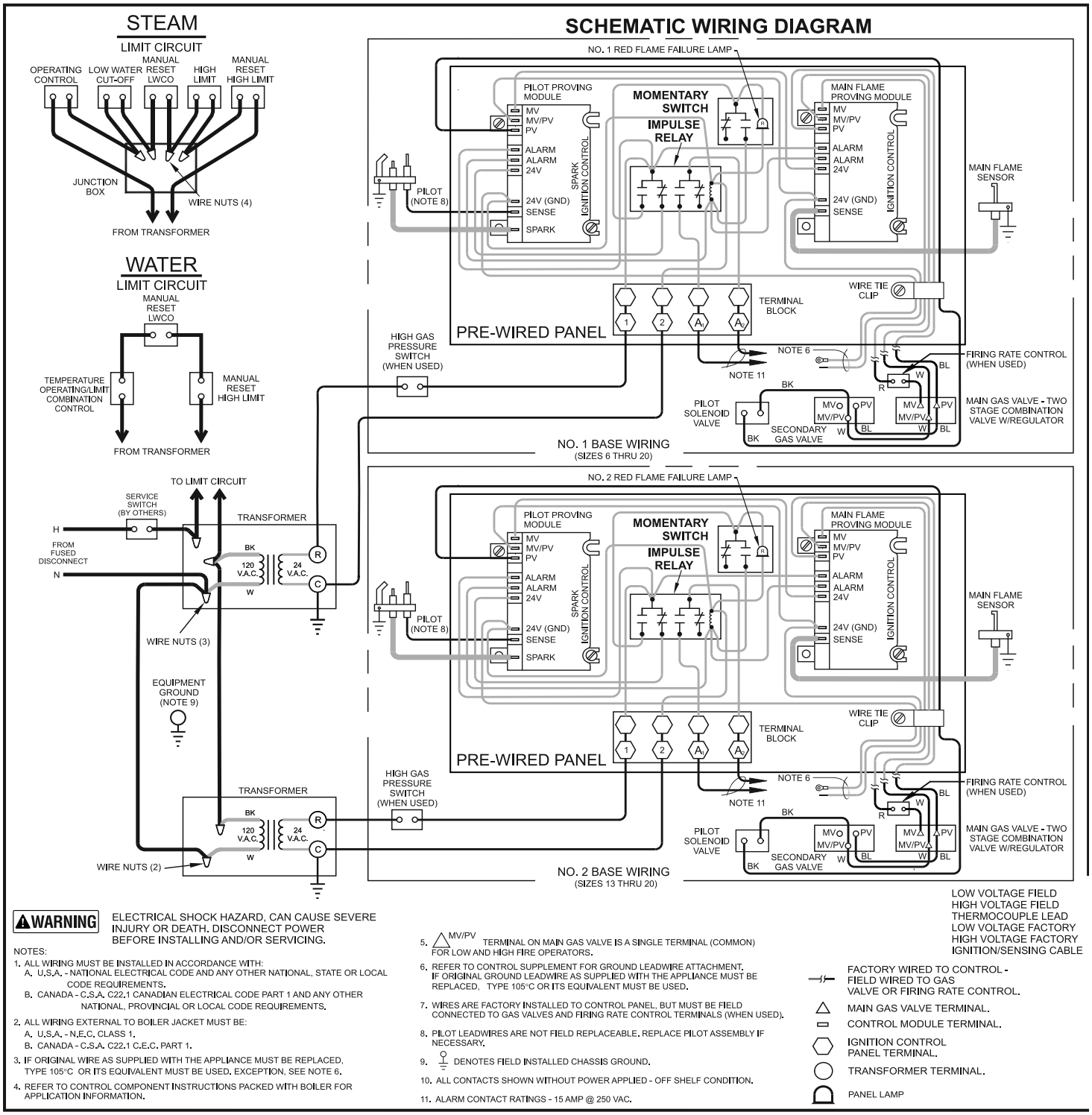
III Water and steam trim components

1. Install water or steam trim components as required by CSD-1 latest edition. See the boiler manual for tapping locations.
   a. Water boilers require:
      - a manual reset high temperature limit control in addition to the standard automatic reset limit control.
      - a manual reset low water cutoff.
   b. Steam boilers require:
      - a manual reset high pressure limit control in addition to the standard automatic reset limit control.
      - a manual reset low water cutoff in addition to the standard automatic reset low water cutoff.

IV Wiring

⚠WARNING For your safety, turn off electrical power supply before making any electrical connections to avoid possible electrical shock hazard.

1. All wiring must be installed in accordance with the requirements of the National Electrical Code and any additional national, state or local code requirements having jurisdiction. All wiring external to boiler jacket must be N.E.C. Class 1.
2. The boiler must be electrically grounded in accordance with the National Electrical Code, ANSI/NFPA No. 70-latest edition. Use 105 °C thermoplastic wire, or equivalent, if any original wire must be replaced (except for pilot spark, sense and ground wires).
3. Wiring to boiler must be No. 14 gauge or heavier. Install in conduit.
4. A separate electrical circuit with a fused disconnect switch (15 amp. recommended) should be used for the boiler.
5. Refer to wiring diagrams, Figure 3 (pages 6 and 7) and Figure 5 (page 9). See section, “Wiring Procedure” on page 8.
6. Figure 5 on page 9 is the Field Wiring Diagram. See Figure 3, pages 6 and 7, for the schematic and ladder wiring diagrams.

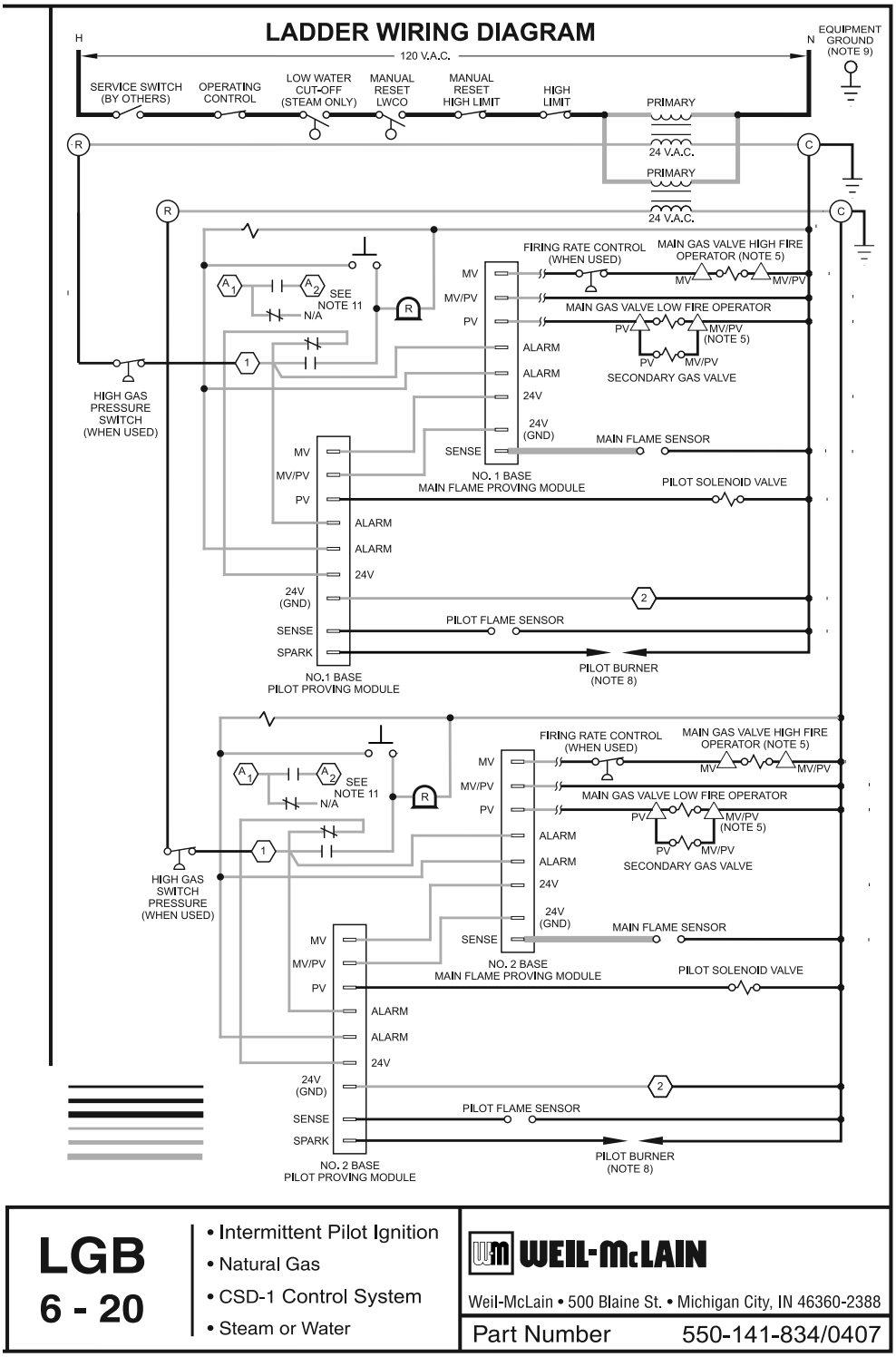


⚠WARNING ELECTRICAL SHOCK HAZARD, CAN CAUSE SEVERE INJURY OR DEATH. DISCONNECT POWER BEFORE INSTALLING AND/OR SERVICING.

NOTES:

1. ALL WIRING MUST BE INSTALLED IN ACCORDANCE WITH:
   A. U.S.A. - NATIONAL ELECTRICAL CODE AND ANY OTHER NATIONAL, STATE OR LOCAL CODE REQUIREMENTS.
   B. CANADA - C.S.A. C22.1 CANADIAN ELECTRICAL CODE PART 1 AND ANY OTHER NATIONAL, PROVINCIAL OR LOCAL CODE REQUIREMENTS.
2. ALL WIRING EXTERNAL TO BOILER JACKET MUST BE:
   A. U.S.A. - N.E.C. CLASS 1.
   B. CANADA - C.S.A. C22.1 C.E.C. PART 1.
3. IF ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, TYPE 105°C OR ITS EQUIVALENT MUST BE USED. EXCEPTION, SEE NOTE 6.
4. REFER TO CONTROL COMPONENT INSTRUCTIONS PACKED WITH BOILER FOR APPLICATION INFORMATION.
5. △ MV/PV TERMINAL ON MAIN GAS VALVE IS A SINGLE TERMINAL (COMMON) FOR LOW AND HIGH FIRE OPERATORS.
6. REFER TO CONTROL SUPPLEMENT FOR GROUND LEADWIRE ATTACHMENT. IF ORIGINAL GROUND LEADWIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, TYPE 105°C OR ITS EQUIVALENT MUST BE USED.
7. WIRES ARE FACTORY INSTALLED TO CONTROL PANEL, BUT MUST BE FIELD CONNECTED TO GAS VALVES AND FIRING RATE CONTROL TERMINALS (WHEN USED).
8. PILOT LEADWIRES ARE NOT FIELD REPLACEABLE. REPLACE PILOT ASSEMBLY IF NECESSARY.
9. ⏚ DENOTES FIELD INSTALLED CHASSIS GROUND.
10. ALL CONTACTS SHOWN WITHOUT POWER APPLIED - OFF SHELF CONDITION.
11. ALARM CONTACT RATINGS - 15 AMP @ 250 VAC.

Figure 3
Wiring diagram



LGB 6 - 20

- Intermittent Pilot Ignition
- Natural Gas
- CSD-1 Control System
- Steam or Water

WEIL-McLAIN

Weil-McLain • 500 Blaine St. • Michigan City, IN 46360-2388

Part Number 550-141-834/0407

IV Wiring - continued

Sequence of operation

1. Operating control begins startup sequence.
   a. Limit control contacts are closed.
2. Pilot proving module energized.
   a. Pilot solenoid opens.
   b. Pilot ignition spark begins.
   c. Pilot ignites.
   d. Pilot proves.

   NOTICE On failure to sense pilot flame, the pilot-proving module will wait 5 minutes, then retry for ignition. Upon 2 consecutive pilot flame failures, the control will lockout and illuminate the red lockout light.
3. Main flame proving module energized from pilot proving module.
   a. Secondary gas valve opens.
   b. Main gas valve opens to low fire position.
   c. Main burners ignite at low fire.
   d. Main flame sensor proves low fire carryover.
   e. Main gas valve opens to high fire position.

   NOTICE On failure to sense main flame, the main flame-proving module will lockout and illuminate the red lockout light.

   f. Main burners increase to high fire.
4. For dual base assembly - operating control energizes controls for each base assembly at the same time. See steps 1 through 3 above.
5. Boiler shuts down when operating control satisfied.

   NOTICE If the boiler locks out, the alarm contacts on the terminal strip (terminals A1 and A2) close. These contacts are rated to 15 amps, 250 V. To reset the boiler, push the red lockout button.

Wiring procedure

1. Determine right or left electrical supply wiring.
2. Attach electrical junction box(es) to inside jacket end panel. Screws and nuts are provided. For dual base boilers, use offset nipples (provided) to connect junction boxes together (as at right), then hang junction boxes by screwing top box to boiler jacket. See Figure 4.
3. Attach control transformer(s) to junction box(es).
4. Drill 1/8" hole in interior jacket panel midway between ignition control panel and left jacket panel. Mount wire support clip using sheet metal screw (furnished).
5. Complete wiring per diagrams, Figure 3 (pages 6 and 7) and Figure 5 (page 9). Terminate at secondary gas valve in valve junction box with wirenuts and strain relief provided.

   NOTICE "Hot" side of line voltage to boiler must be wired directly to limit circuit, then fed to transformer primary(ies).
   Dual Base: "R" terminal of secondaries are to supply power to bases independently of each other. Do not wire "R" terminals together.
6. Install pilot proving and main flame proving ground connections as shown in Figures 1 and 2 and wiring diagram. Route wires through wire support clip.

Figure 4

Junction box assembly dual base boilers

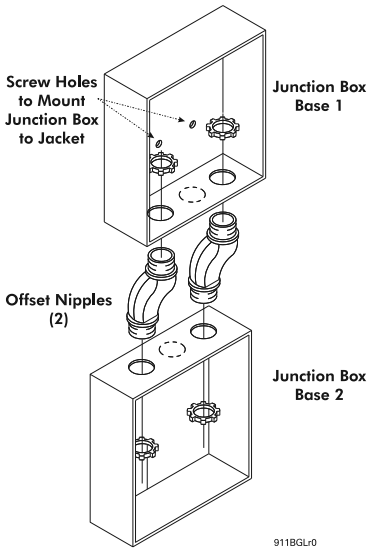
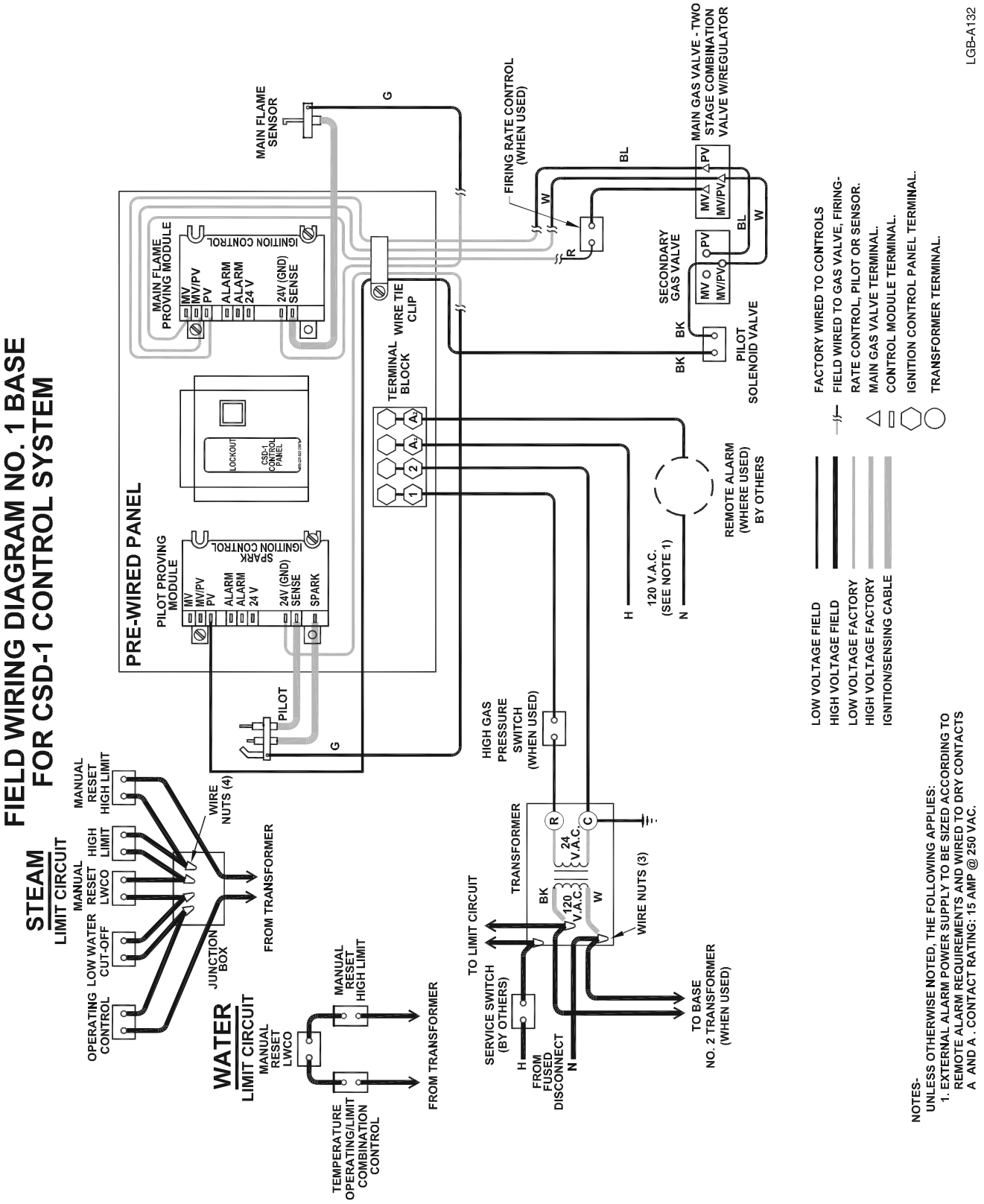


Figure 5

Field wiring diagram



V Leak test procedure

1. Remove red (MV) and blue (PV) wires from main gas valve.
2. Close main test firing valve attached to the manifold.
3. Check that both leak test valves are closed and remove plugs.
4. Attach manometer to first leak test valve.
5. Open first leak test valve and check for pressure.
6. Close first leak test valve and remove manometer.
7. Attach manometer to second leak test valve.
8. Apply call for heat to boiler.
9. Check that electronic pilot proves.
10. Open second leak test valve and check for pressure.
11. Close second leak test valve and remove manometer.
12. Remove call for heat to boiler.
13. Reinstall plugs on leak test valves.
14. Connect wiring to main gas valve.
15. Open main test firing valve attached to the manifold.

NOTICE When checking for pressure at the leak test valves, any small pressure reading is normal. If the pressure continues to increase after opening the leak test valve, the upstream valve is leaking and should be replaced.

VI Operating instructions

⚠WARNING

A. This boiler is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.

B. BEFORE OPERATING, smell all around the boiler area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

WHAT TO DO IF YOU SMELL GAS

- Do not try to light any appliance
- Do not touch any electric switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire department.

C. Do not use this appliance if any part has been under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control, which has been under water.

⚠WARNING

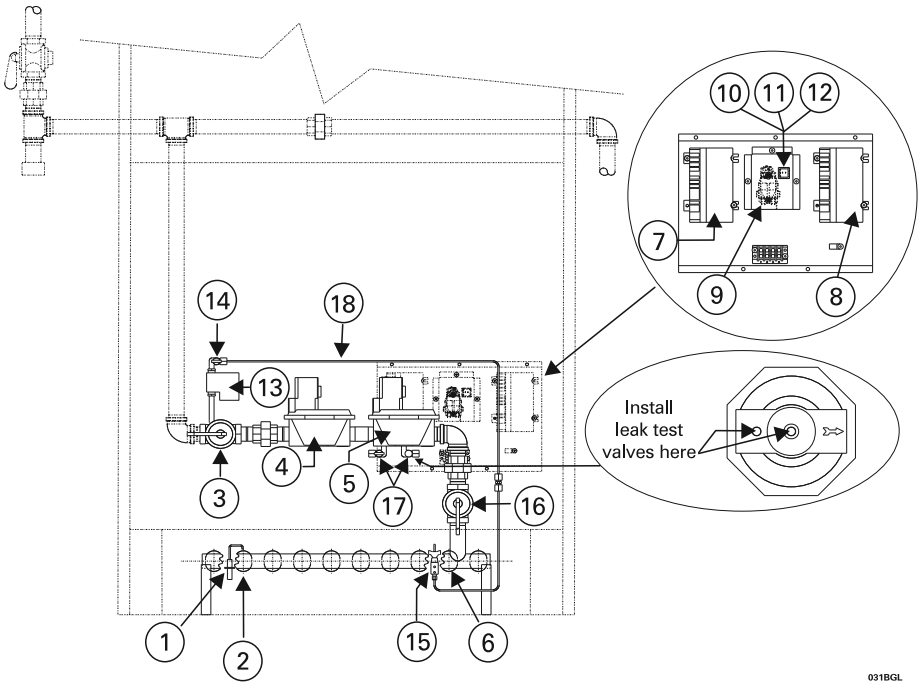
This document is intended only as a supplement to the ***LGB Gas-Fired Boiler Manual.*** Follow all instructions in the Manual, including those regarding start-up (found in Section VIII, "Placing boiler in operation").

Starting boiler

1. STOP! Read the safety information above.
2. Set the *Operating control* to lowest setting.
3. Turn off all electrical power to the appliance.
4. Remove *Front panel.*
5. This appliance is also equipped with an ignition device which automatically lights the second pilot. Do not try to light this pilot by hand.
6. Close the *Pilot shut-off valve* connected to the *Manual main shut-off valve.* Close the *Manual main shut-off valve.*
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor. If you smell gas, STOP! Follow "B" in the safety information above. If you don't smell gas, go to the next step.
8. Open the *Pilot shut-off valve.* Open the *Manual main shut-off valve.*
9. Turn on all electric power to the appliance.
10. Set *Operating control* to desired setting.
11. If the appliance will not operate, turn off gas to the boiler by closing the *Pilot shut-off valve* and the *Manual main shut-off valve.* Turn off all electrical power. Call your service technician or gas supplier.
12. Replace *Front panel.*

VII Parts list

Figure 6



Ref. No.	Description	Size	Vendor/Part Number	Weil-McLain Part Number
1	Main flame sensor		Honeywell 392956	511-724-274
2	Main burner with pilot bracket		Weil-McLain	512-200-055
	Main flame sensor bracket		Weil-McLain	423-300-420
3	Manual main shut-off valve	1"	Kinco-Balon 500	511-246-325
		1 ¼"	Kinco-Balon 600	511-246-330
		1 ½"	Conbraco 50-603	511-246-300
		2"	Conbraco 50-703	511-246-305
4	Secondary gas valve	1"	Honeywell V8943A1003	511-044-191
		1 ¼"	Honeywell V8943A1111	511-044-192
		1 ½"	Honeywell V8943A1129	511-044-193
5	Main gas valve	1"	Honeywell V8944N1053	511-044-214
		1 ¼"	Honeywell V8944N1061	511-044-215
		1 ½"	Honeywell V8944N1079	511-044-216
6	Main burner with pilot bracket		Weil-McLain	512-200-055
	Pilot burner bracket		Weil-McLain	460-005-624
7	Pilot proving module		United Technologies 1003-615	511-300-086
8	Main flame proving module		United Technologies 1003-60	511-330-085
9	Impulse relay		Potter-Brumfield S89R-11ABD1-24	510-350-226
10	Push-button switch		Honeywell AML21CBA2AA Eaton Controls 221K11810	511-624-580
11	Lens cover		Honeywell AML51-C10R Eaton Controls 220PM02A	511-624-581
12	Light bulb		TI-¾ #85 (Available at Local Supply House)	
13	Pilot solenoid		Honeywell V8046C1014 Johnson Controls H91ABG	511-044-039
14	Pilot shut-off valve		Kinco-Balon P2R	511-246-340
15	Pilot burner		Johnson Controls Q90GE-1 Beckett Gas E48A1	511-330-218
16	Firing valve	1"	Watts FBV3-06	511-246-290
		1 ¼"	Watts FBV3-07	511-246-292
		1 ½"	Watts FBV3-08	511-246-294
17	Leak test valve		Kinco-Balon P2R	511-246-340
18	Pilot tubing, alum. ¼ O.D. x .032-20" long		Available at Local Supply House	